



Hecla Mining Company

ESCALANTE UNIT

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MINERALS PROGRAM
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September 5, 1989

DIVISION OF
OIL, GAS & MINING

Lowell Braxton
Administrator
Natural Resources Department
Utah Division of Oil, Gas & Mining
3 Triad Center, Suite 350
Salt Lake City, Utah 84180-1203

SUBJECT: Proposal for Closure of the Hecla Escalante Unit's
Tailings Facility

Dear Mr. Braxton:

Hecla Mining Company is submitting a tailings facility closure plan for our Escalante Unit. As you may know, we are in the process of shutting down all Escalante Unit operations. We have recently closed the mining operations and have initiated approved reclamation activities on those sites. Our stockpiled ore will be depleted in August of 1990. At that time Hecla will shut down our milling and tailings operations. The plan submitted here is for the tailings facility and associated roads. A reclamation plan for mill and operation buildings will be submitted at a later date after salvage and disposal questions can be thoroughly evaluated by Hecla.

The plan is being submitted at this time so that funds can be allocated for specific reclamation activities. Through early planning, we hope to begin the material purchases, contractor bidding process, and other logistics, well in advance of the August 1990 shutdown date. By understanding your requirements, we can initiate these planning steps in the near future. We would like to take full advantage of the 1990 fall reclamation season while some of our employees are still on the payroll.

Hecla understands that other agencies may wish to review our proposal. Since Hecla recognizes the Division of Oil, Gas, and Mining to be the lead mining agency, we have enclosed four copies of the tailing closure proposal for your review and dispersal.

Please feel free to call me if any questions or comments arise.

Very truly yours,

Brent Willoughby
Manager - Escalante Unit

BW:am

Enclosures

cc: Bryan Johnson

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DIVISION OF
OIL, GAS & MINING

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PROPOSAL FOR CLOSURE OF
HECLA'S ESCALANTE SILVER MINE TAILINGS FACILITY

Submitted to
DEPARTMENT OF NATURAL RESOURCES,
DIVISION OF OIL, GAS AND MINING
STATE OF UTAH

By
HECLA MINING COMPANY

ESCALANTE UNIT

August 25, 1989

PROPOSAL FOR CLOSURE OF HECLA'S ESCALANTE SILVER MINE TAILINGS FACILITY

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1.0 INTRODUCTION

Hecla Mining Company and its predecessor Rancher's Exploration and Development Company have committed to reclamation requirements through the permitting, development, and production phases of the Escalante Silver Mine. Hecla recognizes that the Utah Division of Oil, Gas and Mining (Division) has authority over all lands disturbed by mining and milling. This authority is given to the Division under the Utah State Reclamation Act effective May 14, 1975 and the Amended and New Rules Minerals Reclamation Program of December 1, 1988. The later rules do not apply to existing mining operations approved prior to the December 1, 1988 effective date. Hecla's mining operations were approved in 1980.

Since the majority of the tailings impoundment reclamation requirements are described in Rule M-10 of the Utah State Reclamation Act, the proposal will follow that format and outline plans for complying with the Act.

pond depth = 52' by dam

2.0 LAND USE

The tailings impoundment is located on BLM land. Adjacent parcels of land are owned by the BLM as well as Hecla. The pre-operational use of this land included occasional grazing, mining and exploration activities, and wildlife habitat. The probable land uses during the post mining stage will be occasional grazing, minerals exploration activities, and wildlife habitat. Hecla should have no difficulty in returning the disturbed area to a condition capable of supporting these types of land uses.

3.0 PUBLIC SAFETY AND WELFARE

To effectively reclaim the tailings pond, some fences may need to be dismantled temporarily. However, there will be sufficient signs to warn the public during the earth moving stage. Hecla proposes to maintain the current fence and warning signs until the Division and Hecla agree that revegetation is complete and the tailings are immobilized. At that time, the fence and signs will be removed from the property to support post-mining land use as described above.

4.0 IMPOUNDMENTS

The tailings area will be re-contoured in a manner that will not impound water. See the "Revegetation" section, "Toxic Materials" section and "Dams" section for details.

5.0 SLOPES

The downstream slope of the embankment containing the tailings is stable at its present 2 horizontal to 1 vertical slope ratio. Revegetation results from past seeding (1980) on the embankment are successful. This vegetation

will suffice in preventing wind erosion. Water erosion will be controlled by preventing surface water flow from crossing the embankment.

6.0 TOXIC MATERIALS

We will comply with the toxic materials provision of the Act by leaving the mill tailings in an isolated condition, as planned, such that adverse environmental effects are eliminated or controlled.

6.1 Ground Water Protection

Immediately after milling operations have been terminated, the tailings "underdrain" and reclaim solutions from the tailings areas will be diluted with fresh water and returned to the surface of the tailings area for a three months "wash" period. As the weather will allow, the diluted solutions will be distributed over the surface of the tailings to maximize evaporation and to promote neutralization by ultraviolet rays and by lowering the pH. After the initial three month wash, any remaining underdrain solutions will be returned to the surface of the tailings area for further treatment and evaporation. After a treatment period of approximately six to nine months, it is expected that there will be essentially no solution to pump and treat. At this point, the tailings area drains will be permanently sealed by pumping cement grout into the reclaim and underdrain systems.

The net average evaporation loss in the area is about 4 feet per year. Evaporation, capillary action, transpiration and the permeability of the tailings will combine to assure that hydraulic conditions will not affect the containment. Please note however, that the containment is designed for full hydraulic conditions.

$$585.4 \text{ cm/yr} = 19.05 \text{ ft/yr}$$

The August 1984 investigations by Fox Consultants, Inc., from boring through the tailings and the liner confirm earlier test work concluding that average vertical permeability of the tailings is 1.85×10^{-5} cm/sec. The report also stated that a "wetted front" could not be identified in the liner material. The moisture content in the liner was within the original range for compaction moisture. If the assumed 3 inches of penetration is correct, the penetration rate is several orders of magnitude slower than the original theoretical prediction.

This work indicates that, if solutions were continually applied to the surface of the tailings area, the rate of penetration into the tailings would be about 19 feet per year. However, with an average rainfall of 12 inches per year and the 60 inches per year evaporation rate, the tailings will not become saturated. Thus, water from a precipitation or storm event will not contact the liner. As an extra safety factor, a 390 foot clayey soil layer lies below the liner and above the ground water.

what's its permeability rating

This ground water protection process will provide effective isolation of the mill tailings and residual liquids, and will protect

Groundwater level
190' or 390'

ground water quality below the tailings.

6.2 Air Quality and Revegetation

In order to ensure that the surface of the impoundment is protected from wind erosion, Hecla will prepare the site for revegetation. These reclamation activities can begin after the surface of the tailings is driveable.

A mound of tailings will be dozed to the center of the impoundment to allow any large runoff events originating on the impoundment to be safely diverted off the impoundment. A six-inch layer of waste rock will be placed on top of the tailings and will provide an armorment to wind erosion as well as minimize any contaminant uptake by vegetation. A four-inch layer of topsoil will be spread over the surface of the wasterock. The topsoil will then be drilled and seeded with the seed mix identified in the Revegetation Section.

7.0 ROADS AND PADS

The road to the tailings area will be reduced to a one-lane road. Disturbed areas adjacent to this one vehicle width road will be ripped and seeded with appropriate seed mixture. This road will be needed for periodic reclamation inspections and general land management use. Hecla will leave this road in a condition suitable for continued use, complete with the existing drainage structures.

8.0 DRAINAGES

As stated above, the tailings will remain in place. Hecla will recontour the tailings area with the use of wasterock and topsoil to assure the area is left in a stable condition. The recontouring will involve completely filling the tailings pond area such that no water will be impounded on the site and that surface flow and run-off will be directed around the site and into the natural channel without affecting the face of the original containment structure. Storm events or runoff occurring in the basin above the tailings containment area will be diverted via existing canals around both sides of the impoundment so that surface flow is not channeled across the reclaimed surface and the face of the impoundment structure. Any storm events or runoff originating on the containment will be diverted to the containment sides and then to the above mentioned canals. The present canals are currently conditioned to contain a one-hundred (100) year, six hour flood event. The canals will channel storm water to the natural water course below the tailings. Considering the size of this small arid basin (with no visible gullies or watercourses), we believe that the basin will be left in a stable condition that will avoid future damage to the hydrologic system.

9.0 STRUCTURES AND EQUIPMENT

All structures and equipment will be removed from the surface prior to regrading and reclamation. Two exceptions will be ground water monitoring wells and the fence around the tailings perimeter. Hecla proposes to permanently remove the fence around the impoundment when it is agreed that self-sustaining vegetative cover is established. Hecla plans to correctly seal and abandon the ground water monitoring wells when Hecla and the Division agree that monitoring is no longer needed. Hecla believes that if no ground water monitoring anomalies occur through the dewatering, regrading and reseeding phases, then the wells should properly be abandoned.

10.0 SEDIMENT CONTROL

Sediment will be controlled by revegetating the surface of the tailings, revegetating the topsoil storage area and by placing water bars in the access road to the tailings. Other measures to control sediment are described in the "Drainages" section of this proposal.

11.0 REVEGETATION

The tailings impoundment revegetation process will consist of wasterock placement, topsoil placement, seedbed preparation, seeding, vegetation establishment and maintenance. The revegetation process will begin once equipment can work on the impoundment without sinking. Vegetation on the impoundment embankment has already been established.

11.1 Wasterock Placement

Hecla has stockpiled mine wasterock near the mill site. This wasterock will be trammed to and spread out on the impoundment surface. There is adequate supply of wasterock to place six (6) inches of rock over the surface. The wasterock will be hauled by trucks and graded with a dozer.

11.2 Topsoil Placement

will provide @ 7.35 inches topsoil over a 60 acre area

The topsoil stockpile is located southwest of the tailings impoundment near the basin ridge. It is estimated that 59,300 cubic yards of topsoil has been stored for tailings revegetation. Hecla will spread no less than an average four inches of topsoil across the tailings area. The topsoil will be groomed by use of a dozer. Some small irregularities or depressions in the topsoil placement may be left to create microsite for bitterbrush and serviceberry, and other species.

11.3 Seedbed Preparation

After topsoil placement, the topsoil will be drilled with seed. Some wasterock may be brought to the surface during this process. This wasterock, if any, will help establish a natural look and create

microsites for seeded and natural pioneering species.

11.4 Seeding

The topsoil stockpile was seeded in the early 1980's with the following seed species:

Crested Wheatgrass
Russian Wildrye
Alfalfa
Clover

The stockpile now supports a healthy vegetation mix. Some native species have invaded the topsoil stockpile. It appears the most dominant species is the crested wheatgrass. In October 22, 1980, James W. Smith Jr., of the Division recommended a species mix and seeding rate. Depending on seed availability, Hecla plans to follow the Division's 1980 recommendation described below:

<u>Species</u>	<u>lbs/ac</u>
Great Basin wildrye (<u>Elymus cinereus</u>)	3
Indian ricegrass (<u>Oryzopsis hymenoides</u>)	2
Western wheatgrass (<u>Agropyron smithii</u>)	3
Slender wheatgrass (<u>Agropyron trachycaulum</u>)	
or pubescent (<u>A. trichphorum</u>)	2
Yellow sweetclover (<u>Melilotus officinalus</u>)	
or Utah sweetvetch (<u>Hedysarum boreale</u>)	3
Lewis flax (<u>Linum lewisii</u>)	
or Arrowleaf balsamroot	
(<u>Balsamorhiza sagittata</u>)	1
Palmer penstemon (<u>Penstemon palmeri</u>)	$\frac{1}{2}$
Flourwing saltbush (<u>Atriplex canescens</u>)	
or gardner (<u>A. gardneri</u>)	1
Ephedra (<u>Ephedra spp.</u>)	1
Winterfat (<u>Ceratoides lanata</u>)	1
	<u>17$\frac{1}{2}$ TOTAL</u>

We realize that almost ten years has past since this recommendation has been made. If the Division has found that a different seed mix would be more successful in establishing a diversity of vegetation, we would be open to suggestions. It is expected that many of the species currently growing in the topsoil will continue to grow in the tailings area.

12.0 DAMS

As described in the "Toxic Materials" section, the tailings impoundment will not impound water although the impoundment was designed for hydraulic conditions. The impoundment will impound tailings but will be mechanically stable, protected from erosion, and protected from contaminant mobility.

13.0 SOILS

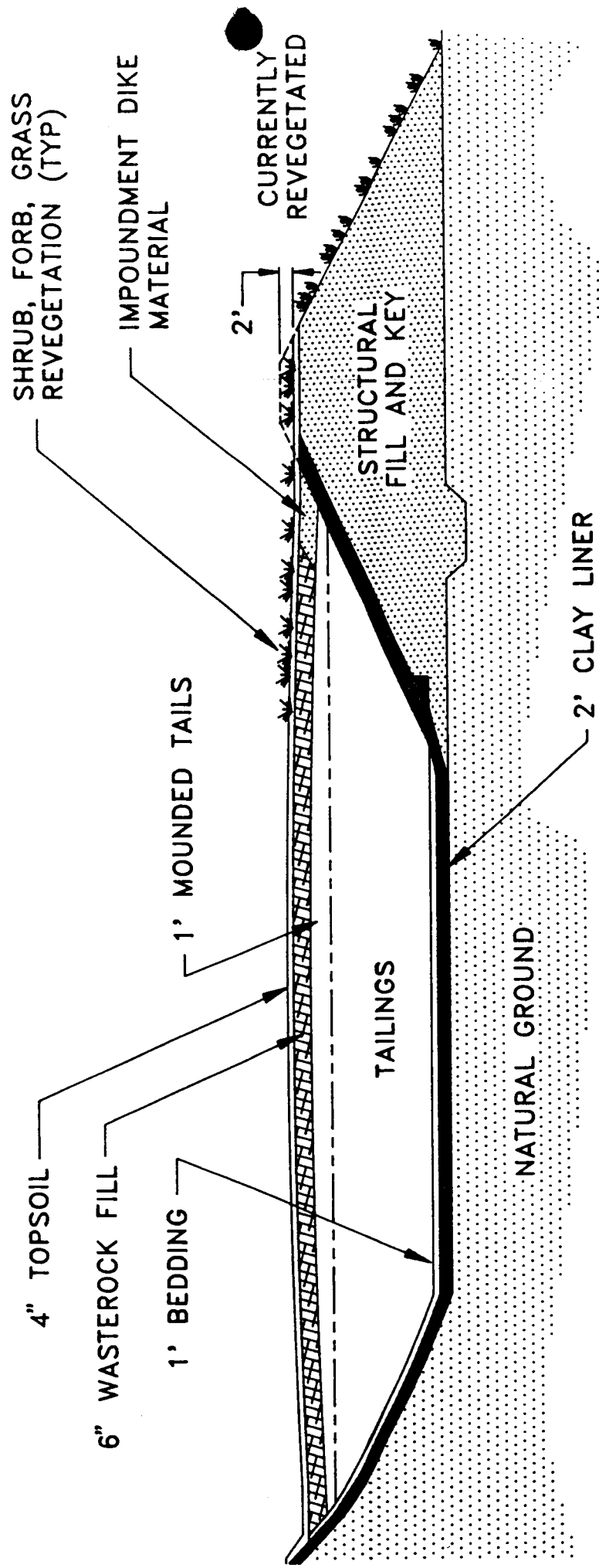
The topsoil, wasterock and tailings materials have been sampled and analyzed for nutrients, metals, and other soil indicators. The "washing" cycles of the tailings material will lower the pH which should also reduce the potential for any metals uptake by vegetation. Since there will be a six inch buffer material of wasterock between the tailings and the topsoil, and the metals levels are relatively low and immobile for tailings, vegetative toxicity due to metals is not a concern. no!

14.0 CLOSURE SCHEDULE

<u>Activity</u>	<u>Anticipated Date</u>
1. Escalante Mill Shuts Down	August, 1990
2. Start a Three-month Tailing Wash Cycle	September - November, 1990
3. Residual Tailings Solution Capture and Treatment	November, 1990 - August, 1991
4. Cap and Grout Tailings Water Underdrains	September, 1991
5. Earth Moving <ul style="list-style-type: none">• Wasterock• Topsoil	September 1 - 15 September 15 - 31
6. Seeding and Fertilizing	October, 1991
7. Erosion Control and Revegetation Maintenance	October, 1991
8. Bond Release	December, 1994

15.0 DIAGRAM

The attached diagram shows an East/West cross section through the tailings impoundment. This section shows the original ground surface, the clay liner, tailing material, wasterock, topsoil and vegetation layers.



NO SCALE

EAST/WEST SECTION ESCALANTE SILVER MINE TAILINGS CLOSURE PLAN